User manual

InterBus-S master module

Version 9809:1.02

HITACHI

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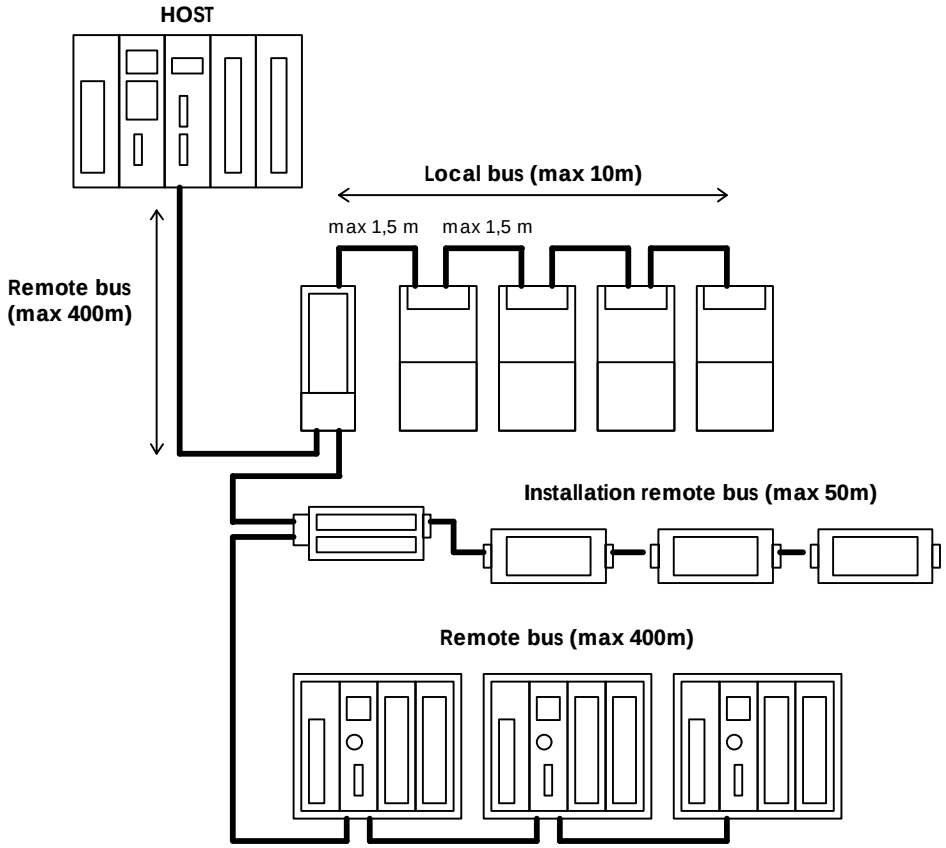
1. General INTERBUS-S information

This section contains a short technical and functional description of the INTERBUS-S standard. For a more detailed description please consult the INTERBUS-S specification.

INTERBUS-S topology



INTERBUS-S basic specification

Remote bus

Max. length of remote bus segment:	400m
Max. bus cable length between:	
- Host and first remote bus module	400m
- two remote bus modules	400m
- Host and last remote bus module	12,8 km
Transmission rate:	500 kbits/s
Transmission medium:	RS-485

2. The INTERBUS-S MASTER module

This section contains a general technical and functional description of the INTERBUS-S master unit (IBSM).

Features

- **INTERBUS-S compatible**
- **Fast update time (32 units with 2048 I/O points are updated in 7,2 ms)**
- **Handles 2048 I/O points (2048 inputs and 2048 outputs)**
- **Easy to configure and program**
- **Supports INTERBUS-S diagnostic software.**

Function description

The Hitachi INTERBUS-S master module, named IBSM, is designed to operate as a master unit in a INTERBUS-S network.

The IBSM work's together with the H252 CPU units from Hitachi in a BSH base. Two IBSM units can be installed in the same base and each IBSM unit can handle 2048 input points and 2048 output points.

The IBSM module is easy to use and configure. All the INTERBUS-S dependent configurations is done through the PLC program in CPU unit. The only configurations done on the IBSM module is the "SH", "EEPR" , "ER" and "RI" selections, see section 3 for further details.

For the programmer the IBSM module will act like a normal link module, i.e. the INTERBUS-S I/O data is stored in the link area. If the IBSM module fails to transfer the I/O data the ERROR-word is set to one otherwise it is set to zero. The type of error is indicated in the ERROR-word(most significant byte) and on the front-panel display.

The IBSM module supports the INTERBUS-S diagnostic software. This tool is a standard INTERBUS-S program for diagnostics. The PC with the diagnostic software(IBS SYS SWT) is connected to the RS232 port on the IBSM module. The communication cable used is a standard RS232 cable according fig:

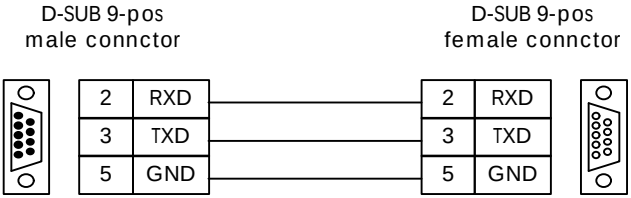


Figure 1 Connection cable between PC and IBSM

3. Installation and configuration

The following section contains a description over the installation and configuration steps that the user have to observe.
* The IBSM module shall be mounted close as possible to the CPU.

Hardware set-up

The hardware set-up is done with a DIP-switch on the IBSM circuit board. The DIP-switch is located on the circuit board according to figure 2 below:

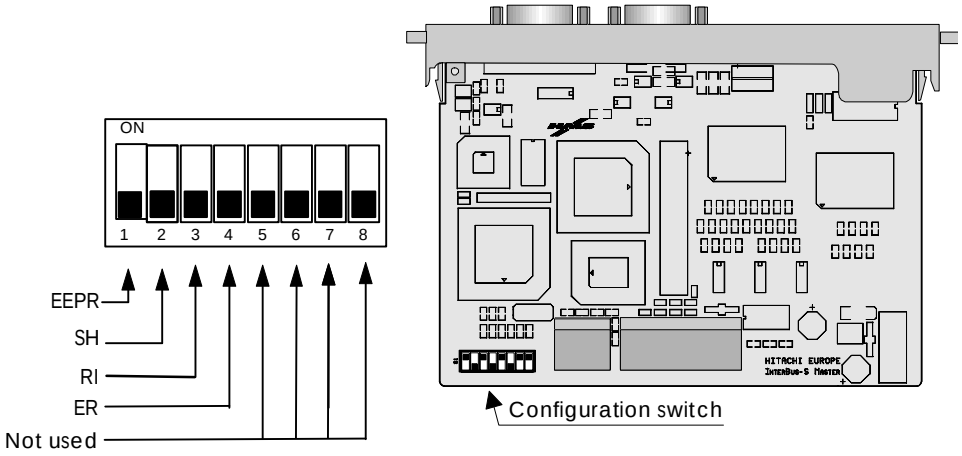


Figure 2 Configuration switch

The hardware set-up controls the following two functions:

1. Always set to off, Switch 1
2. SH (Stop Hold), Switch 2
3. RI (Run Indication), Switch 3
4. ER (Error Recover), Switch 4

Switch 5 - 8 is not used in this version of the IBSM module

EEPROM

- This feature is not supported.

Always set switch to off

Stop Hold

This function enables the user to select whether or not the output data from the master should be set to zero when the CPU key is changed to STOP mode.

- when switch 2 is in ON position, output data from the IBSM will forced to zero.
- when switch 2 is in OFF position, IBSM freezes current output data.

Run-indication

This switch choose the way in which normal operation(bus is running and data is transferred) is indicated on the display.

- When switch 3 is in ON position normal operation is indicated by a blank display.

- When switch 3 is in OFF position normal operation is indicated with a "running light" in the display.

Error-recover

This switch selects recover-method when an INTERBUS-error has occurred.

- When switch 4 is in ON position the IBSM will try to recover from INTERBUS-errors automatically.

- When switch 4 is in OFF position the IBSM will try to recover from InterBus-errors automatically the first 60s after power-up, after that is manual reset with the reset-button used to recover from the error.

Software set-up

The only configuration done from the PLC set-up is to specify the number of output words i.e. the total number of output words for the INTERBUS-S slave units connected to the system. The number of input words is always the same as the number of output words according to the INTERBUS-S standard.

The IBSM modules uses the LINK AREAS in the PLC memory. The first IBSM module (the one installed closest to the CPU) uses LINK AREA 1. If a second IBSM module is installed it will use LINK AREA 2. The number of output words is specified by the LINK END address of each LINK AREA. The LINK START address must always be set to zero. See section 5 for a detailed example of the configuration and set-up.

INTERBUS-S BUS cable

The pin layout of the IBS remote connector follow the INTERBUS-S standard according figure 3 below.

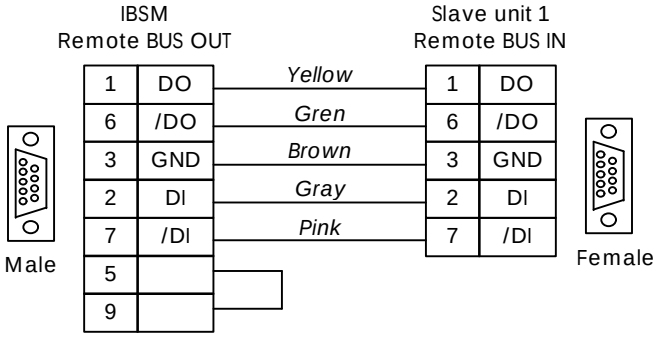


Figure 3 INTERBUS-S BUS cable

4. Indications and IBSM front panel

All INTERBUS-S status information is available on the IBSM front panel according figure 5.

There is also some information for the PLC, this information is stored in the WR area according to the table below.

NAME	ADDRESS LINK1	ADDRESS LINK2
ERROR	WRF0F9	WRF159
MAX REFRESH TIME	WRF13D	WRF19D
MIN REFRESH TIME	WRF13E	WRF19E
PREVIOUS REFR. TIME	WRF13F	WRF19F

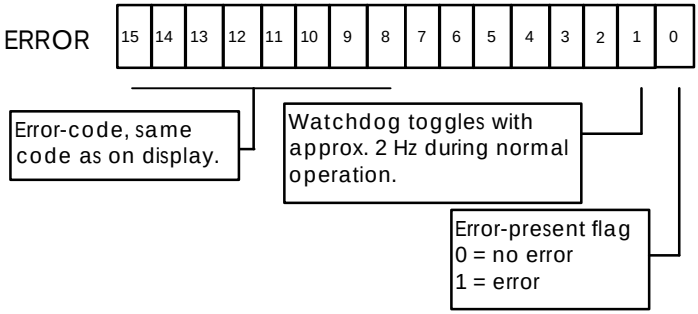


Figure 4 Content of ERROR-word

Bit 0 in the ERROR register is set if the IBSM is in error-mode(E displayed on the leftmost display). The error-code(same as on display) is stored in the most significant byte, see figure 4. Bit 1 in the ERROR register is toggling with 2 Hz during normal operation(data is transferred). This bit is working as a watchdog for the PLC-program.

The min, max and previous time is the time of one communication cycle. Min and max refresh time is the longest and shortest times

measured. Previous refresh time is the time that the last communication cycle used.

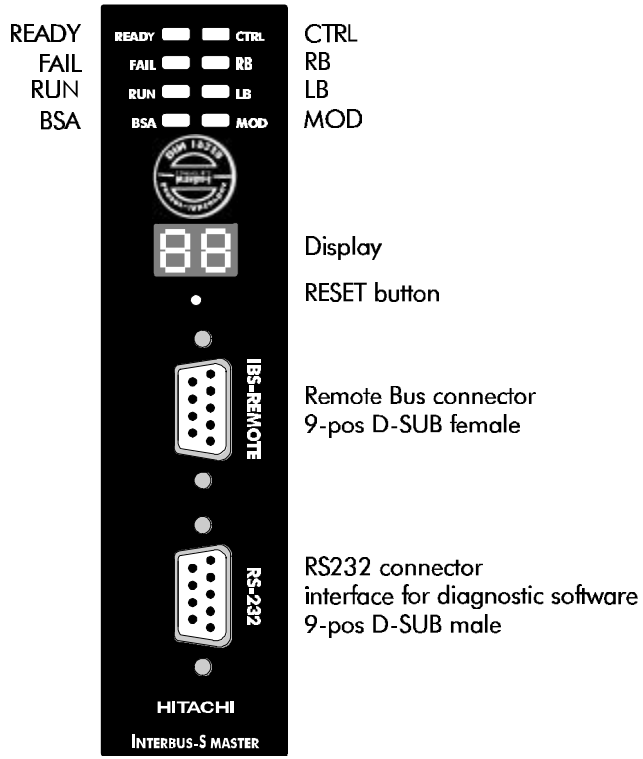


Figure 5 IBSM front panel

The LED (Light emitting diodes) indicates the following:

LED	Function
READY	IBSM module ready
FAIL	IBSM module error
RUN	INTERBUS-S cycles running
BSA	BUS segment disabled
CTRL	IBSM Interface error
RB	Remote BUS error
LB	Local BUS error

MOD	Module error

The front panel display indicates the following:

Display	Function
E1	INTERBUS-S system error, press RESET to recover
E2	The slot that the IBSM is placed in is not configured to CPU-LINK. Configure the CPU and the system will recover automatically.
E3	LINK start address error (should always be set to zero), reload set-up and press RESET to recover.
E4	Too many output words (LINK end address > 7FH), reload set-up and press RESET to recover
E5	Fatal IBSM error the only way to recover is power down and power up again. If the module does not recover it has to be replaced.
E6	Communication with H-252 failed. Reconfigure H-252 to recover.

If the RESET button is pressed during normal operation the number of connected slave modules is shown on the display.

5. Programming the IBSM

The following section contains a simple step by step guide about how to use the IBSM module in a project.

Step 1 *Make a map over the INTERBUS-S network.*
The first step is to document (map) the INTERBUS-S system in the application. Doing so the number of input and output words will be given. If the number of I/O words exceeds 2048, two separate InterBus networks have to be used.

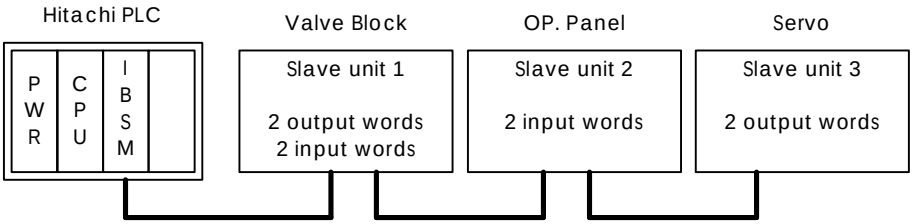


Figure 6 Example INTERBUS-S system

Step 2 *Transfer the INTERBUS-S MAP to the PLC programming project.*
When the INTERBUS-S system is documented the MAP has to be transferred to the PLC program. Since only one IBSM module is needed it will work with data in LINK AREA 1. The system above gives the following PLC set-up:

WL1 START address: 00H (always zero)
WL1 END address: 05H (three 2 words units are used 0 - 5)

Adress	*Label*	*Description*
WL0000	VB_OUT1	First output word, Valve Block
WL0001	VB_OUT2	Second output word, Valve Block
WL0002	-	OP. Panel output word 1 (dummy)
WL0003	-	OP. Panel output word 2 (dummy)
WL0004	SERVO_1	First output word, Servo controller
WL0005	SERVO_2	Second output word, Servo controller
WL0006	VB_IN1	First input word, Valve Block
WL0007	VB_IN2	Second input word, Valve Block
WL0008	OP_1	First input word, OP panel
WL0008	OP_2	Second input word, OP panel
WL0009	-	First input word, Servo (dummy)
WL000A	-	Second input word, Servo (dummy)

Note! If a INTERBUS-S slave module only have input or output words it always have the same amount of output or input words.

Step 3 *Install and configure the IBSM module.*
The IBSM module fits in a BSH base with a H250 or H252 Hitachi CPU. The only set-up done on the IBSM circuit is the "SH" function described above. If two IBSM modules are installed in the same base, the IBSM module closest to the CPU will operate on LINK AREA 1 and the second will operate on LINK AREA 2.

Step 4 Write the PLC program.
The last step is to write the actual PLC program. If all the steps above is accomplished the program will be much easier to write and maintain for future.

6. Troubleshooting

The following section contains a short description over those errors that can be encountered when the IBSM module is used.

Common ERROR description

This section will be updated as soon as feedback information from the end users are available.